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Notes on a parasitic *Gnomonia**

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In the month of July, 1906, while looking for the presence of anthracnose on the canes of the blackberry, *Rubus nigrobaccus*, in the vicinity of Ithaca, New York, I found in the garden of Professor Whetsel a few canes that were affected with a pyrenomycete, a member of the genus *Gnomonia*. Thinking that this might be the perfect stage of the anthracnose, I gathered material and made a study of it. The result of the study showed that the fungus had no connection with the *Gloeosporium*, yet from the fact that it seems to be undescribed in this country and may occasionally cause disease of the blackberry canes, it seems well to make a note of it with drawings and photographs.

The disease evidently made its appearance in the spring, as spots were noticed on the canes at pruning time. But no effect on the canes had been noticed at that time. Leaves developed normally, blossoms appeared on the stems, and the fruit set, so that the plants had the appearance of being perfectly healthy. It was not until the fruit was a little over half grown that the effect of the disease was noticed. Very suddenly, the leaves and the fruit above the spots wilted and dried up. The effect on the plant seemed to be that of girdling. The appearance of the canes was very similar to the cane blight of raspberries caused by a species of *Coniothyrium*, as described by Stewart and Eustace.† The plants were in this condition when they were first observed by the writer. The spots at this time were very evident, being two to five inches in length and completely encircling the stems, somewhat lighter in color than the healthy regions and possessing a dry, dead appearance.

An examination of the spots showed the presence of numerous black perithecial beaks, which appeared to the naked eye as small black setae, protruding through the dead cortex (FIG. 1). The main body of the perithecium was imbedded in the host tissue.

* Contribution from the Department of Botany, Cornell University, No. 123.

† New York Experiment Station Bulletin no. 226, Geneva, N. Y.

The microscopic characters of the fungus as I have determined them are as follows: The perithecia (FIG. 2) are subglobose, $200\text{--}260 \times 175\text{--}220 \mu$, filled with the numerous asci. The asci (FIGS. 3*a*, *b*) are long-clavate, $30\text{--}50 \times 6\text{--}9 \mu$, and contain as a rule but four spores, though occasionally some aborted spores may be seen at

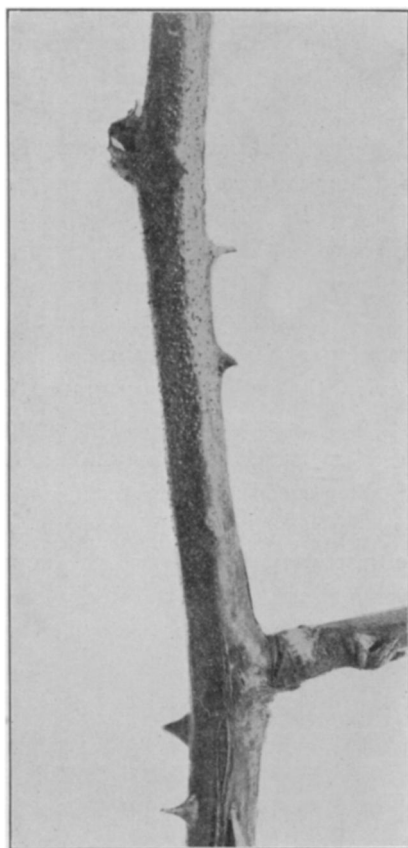


FIG. 1. *Gnomonia Rubi* Rehm on stem of *Rubus nigrobaccus*. Shows the beaks of the perithecia protruding through the cortex.

the base. The pore through which the spores escape, although not as prominent as in some other members of the genus *Gnomonia*, is surrounded by the thickened cellulose ring which appears as a refractive dot on each side of the opening. The spores (FIG. 3*c*) are in one or two series, filling nearly the whole ascus, about

14-19 \times 3-5 μ . They are two-celled, the two cells being equal, constricted at the septum, somewhat fusoid, quite often guttulate. Each end of the spore is continued into a long hyaline point, but this falls away very readily so that the end of the spore has a rounded appearance (FIG. 3*d*). Paraphyses are absent.

Cultures of the ascospores were made in bean agar. The spores germinated readily by sending out a germ-tube at each end (FIG. 3*e*). No germ-tube was seen coming from the side of the spore. A much-branched and septate mycelium resulted

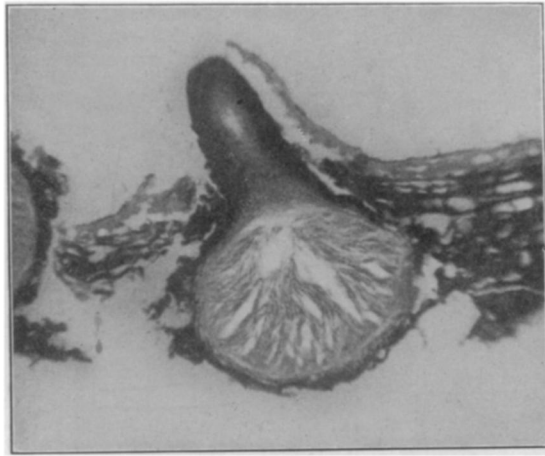


FIG. 2. Photomicrograph of a section of a perithecium of *Gnomonia Rubi*.

which spread rapidly over the agar, forming a very thin submerged growth. Pieces of the agar were transferred to sterilized bean pods and blackberry stems. On both substrata, growth continued rapidly. In about ten to fourteen days, perithecia with the same appearance and structure as those originally found on the blackberry began to form. The only observable difference was in the beak of the perithecium. This was much longer on the perithecia formed in pure culture, and quite often it was bent back in the form of a hook near the apex. This same variation in the length of the beak in pure culture has been noticed by Klebahn* in another member of the genus, *Gnomonia veneta*

* KLEBAHN, H. Ueber einige *Fungi imperfecti* und die zugehörigen Ascomycetenformen. Jahrb. für wissensch. Botanik 41: 519. f. 4. 1905.

(Sacc. & Speg.) Kleb. In no culture in the laboratory nor on the material collected on the blackberry was I able to find a trace of a conidial stage.

This fungus was first named by Rehm, *Gnomonia tetraspora* Wint. var. *Rubi* Rehm, but in volume IX of the *Sylloge Fungorum*, Saccardo considers it a good species and uses the name *Gnomonia Rubi* Rehm. The latter name seems to be preferable and will be used here. Some of the material was sent to Rehm and the identification was confirmed by him.

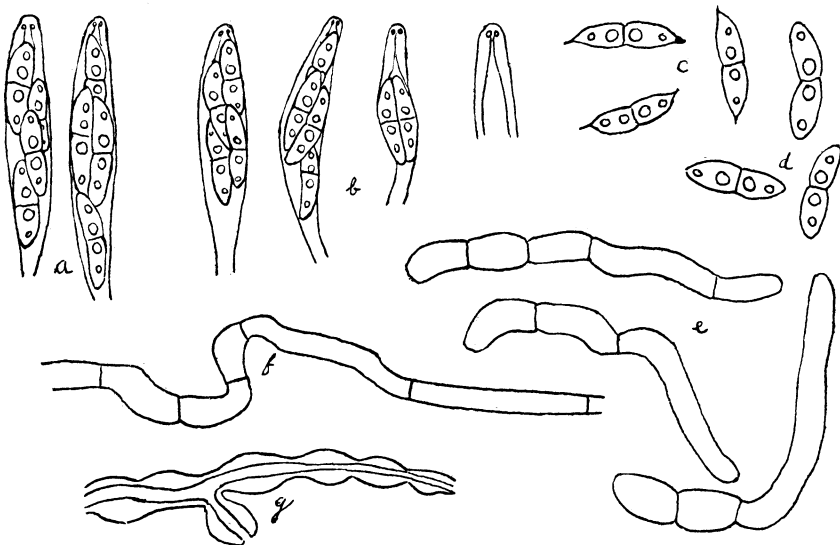


FIG. 3. *Gnomonia Rubi* Rehm. (a) Asci from perithecia from the blackberry. (b) Asci from perithecia in pure culture. (c) Ascospores. (d) Ascospores as they appear after losing their appendages. (e) Ascospores germinating. (f) The same older stage. (g) Irregularly thickened mycelial thread, a common condition in old cultures.

To prove the connection of the fungus with the disease on the canes, inoculation experiments were attempted in 1907. Early in the spring, in the greenhouse, some young plants were inoculated with a pure culture of the fungus. The plants were very young, the canes being perfectly green. This inoculation was a failure; the fungus did not seem to be able to attack the young actively growing canes.

Later in the season, on May 9, about ten or twelve blackberry

plants growing wild near Ithaca were inoculated, the inoculations being made at various places on the canes. As a result of these inoculations, two plants became infected with the disease. Why the other eight or ten inoculations did not take may possibly have been due to a loss of virulence, caused by growing the fungus for ten months on artificial media. However the wild blackberry plants may be more resistant to the attacks of these forms than the cultivated varieties and this may have had something to do with the poor infection. One of the successful inoculations was on a wound made by cutting off the entire upper third of the plant. The disease followed down the stem and in a few weeks perithecia were produced in abundance. In the other successful inoculation, the pure culture of the fungus was inserted in a wound made by removing one of the small side branches. The disease spread in all directions, finally encircling the stem. The plant was not killed as suddenly as the original plants that were found, but died more gradually. Fruit set on the branches, but most of it dried up before it matured. Perithecia were produced on the diseased portion about three or four months after the inoculation. However, these were not produced in such great abundance as they were on the original plants.

The results of this study seem to show that the fungus *Gnomonia Rubi* Rehm is a weak facultative parasite, a form that will grow rapidly as a saprophyte on the dead canes and will if conditions are suitable adapt itself to the living cane. It does not seem probable that it is a form that is liable to become a serious pest to blackberry canes, but rather one that may appear as a parasite only occasionally, only when the conditions are right.